

## **AMENDMENTS TO THE CLAIMS**

The following listing of claims will replace all prior versions and listings of claims in the application.

### **LISTING OF CLAIMS**

1. – 3. (Cancelled)

4. (Currently Amended) ~~The porous glass composite materials of claim 37, A~~  
porous glass composite material comprising a gel that comprises water and a polymeric  
network comprising an alkoxosilane derivative, the network having a group of alterable  
charge, a hydrophobic group and a hydrophilic group, wherein the alkoxosilane  
derivative is a derivative of an alkoxosilane having the general formula  $(OR^1)_3Si$ -spacer-  
 $Si(OR^2)_3$ , wherein  $R^1$  and  $R^2$  are the same or different and are selected from the group  
consisting of hydrogen, unsubstituted branched and unbranched  $C_{1-20}$ alkyls, substituted  
branched and unbranched  $C_{1-20}$ alkyls, unsubstituted branched and unbranched  $C_{1-}$   
 $_{20}$ alkenyls, substituted branched and unbranched  $C_{1-20}$ alkenyls, unsubstituted branched  
and unbranched  $C_{1-20}$ alkynyls, substituted branched and unbranched  $C_{1-20}$ alkynyls,  
substituted, unsubstituted, and multiple ring aryl groups, and combinations thereof, and

where  $R^1$  is selected from the group consisting of  $n-(CH_2)_2CH_3$ ,  $n-(CH_2)_3CH_3$ , -  
 $CH(CH_3)_2$ ,  $-CH_2CH(CH_3)_2$ ,  $-CH(CH_3)CH_2CH_3$ ,  $-CH_2CH(CH_3)_2$ ,  $-CH(CH_3)CH_2CH_3$ ,  $OPh$ , -  
 $CH_2CH_2OH$ ,  $-CH_2CH_2OCH_3$ ,  $n-CH_2(CH_2)_{18}-CH_3$ ,  $n-O(CH_2)_3CH_3$ ,  $OCH(CH_3)_2$ ,  
 $OCH(CH_3)_2$ ,  $OCH_2CH(CH_3)_2$ ,  $OCH(CH_3)CH_2CH_3$ ,  $OCH_2CH_2OH$  and  $OCH_2CH_2OCH_3$ .

5. (Currently Amended) ~~The porous glass composite material of claim 37, A~~  
porous glass composite material comprising a gel that comprises water and a polymeric  
network comprising an alkoxosilane derivative, the network having a group of alterable  
charge, a hydrophobic group and a hydrophilic group, wherein the alkoxosilane  
derivative is a derivative of an alkoxosilane having the general formula  $(OR^1)_3Si$ -spacer-  
 $Si(OR^2)_3$ , wherein  $R^1$  and  $R^2$  are the same or different and are selected from the group  
consisting of hydrogen, unsubstituted branched and unbranched  $C_{1-20}$ alkyls, substituted  
branched and unbranched  $C_{1-20}$ alkyls, unsubstituted branched and unbranched  $C_{1-}$   
 $_{20}$ alkenyls, substituted branched and unbranched  $C_{1-20}$ alkenyls, unsubstituted branched  
and unbranched  $C_{1-20}$ alkynyls, substituted branched and unbranched  $C_{1-20}$ alkynyls,  
substituted, unsubstituted, and multiple ring aryl groups, and combinations thereof; and

wherein  $R^2$  is selected from the group consisting of  $n-(CH_2)_2CH_3$ ,  $n-(CH_2)_3CH_3$ , -  
 $CH(CH_3)_2$ ,  $-CH_2CH(CH_3)_2$ ,  $-CH(CH_3)CH_2CH_3$ ,  $-CH_2CH(CH_3)_2$ ,  $-CH(CH_3)CH_2CH_3$ ,  $OPh$ , -  
 $CH_2CH_2OH$ ,  $-CH_2CH_2OCH_3$ ,  $n-CH_2(CH_2)_{16}-CH_3$ ,  $n-O(CH_2)_3CH_3$ ,  $OCH(CH_3)_2$ ,  
 $OCH(CH_3)_2$ ,  $OCH_2CH(CH_3)_2$ ,  $OCH(CH_3)CH_2CH_3$ ,  $OCH_2CH_2OH$  and  $OCH_2CH_2OCH_3$ .

6. (Currently Amended) The porous glass composite material of claim [[37]]  
5, further comprising a catalyst that is an acid catalyst or a base catalyst.

7. (Original) The porous glass composite material of claim 6, wherein the  
catalyst is selected from the group consisting of  $HCl$ ,  $HNO_3$ ,  $H_2SO_4$ ,  $HClO_4$ ,  $NaOH$ ,  
 $KOH$ ,  $NH_4OH$ ,  $NH_3$ ,  $NH_2OH$ ,  $C_5H_5N$ ,  $C_6H_5NH_2$ , and combinations thereof.

8. (Currently Amended) The porous glass composite material of claim [[37]]  
5, further comprising, entrained within the gel, an additive for imparting to the glass  
composite material a desired functional property.

9. (Original) The porous glass composite material of claim 8, comprising, entrained within the gel, two or more additives for imparting to the glass composite material a desired functional property.

10. (Previously Amended) The porous glass composite material of claim 8, wherein the additive is an alkoxosilane precursor having the general formula  $R_nSi(OR)_4$ , wherein R is the same or different and is hydrogen, unsubstituted branched and unbranched  $C_{1-20}$ -alkyl, substituted branched and unbranched  $C_{1-20}$ -alkyl, unsubstituted, branched and unbranched  $C_{1-20}$ -alkenyl, substituted branched and unbranched  $C_{1-20}$ -alkenyl, unsubstituted branched and unbranched  $C_{1-20}$ -alkynyl, substituted branched and unbranched  $C_{1-20}$ -alkynyl, or substituted, unsubstituted, and multiple ring aryl group, and  $n=1$  to 3.

11. (Currently Amended) ~~The porous glass composite material of claim 8; A~~ porous glass composite material comprising a gel that comprises water and a polymeric network comprising an alkoxosilane derivative, and an additive entrained within the gel, for imparting to the glass composite material a desired functional property, the network having a group of alterable charge, a hydrophobic group and a hydrophilic group, wherein the alkoxosilane derivative is a derivative of an alkoxosilane having the general formula  $(OR^1)_3Si$ -spacer- $Si(OR^2)_3$ , wherein  $R^1$  and  $R^2$  are the same or different and are selected from the group consisting of hydrogen, unsubstituted branched and unbranched  $C_{1-20}$ alkyls, substituted branched and unbranched  $C_{1-20}$ alkyls, unsubstituted branched and unbranched  $C_{1-20}$ alkenyls, substituted branched and unbranched  $C_{1-20}$ alkenyls, unsubstituted branched and unbranched  $C_{1-20}$ alkynyls, substituted branched

and unbranched C<sub>1-20</sub>alkynyls, substituted, unsubstituted, and multiple ring aryl groups, and combinations thereof; and

wherein the additive is an alkoxosilane precursor selected from the group consisting of

(OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>NHCH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub>; (OR)<sub>3</sub>Si-H<sub>2</sub>CH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>CH<sub>2</sub>NHCH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub>;

(OR)<sub>3</sub>Si-R; (OR)<sub>3</sub>Si-CH<sub>2</sub>(CH<sub>2</sub>)<sub>16</sub>CH<sub>3</sub>; (OR)<sub>2</sub>Si-(R)<sub>2</sub>;

(OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>NHCH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub>;

(OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>N((COO-Na+)CH<sub>2</sub>CH<sub>2</sub>N(COO-Na+))<sub>2</sub>;

(OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>SH; (OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OCH<sub>2</sub>CH<sub>2</sub>OCH<sub>2</sub>;

(OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>N; (OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>NCO;

(OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>COOR; (OR)<sub>3</sub>Si-ROH; (OR)<sub>3</sub>Si-RCOOH; (OR)<sub>3</sub>Si-RCHO;

(OR)<sub>3</sub>Si-RCOR; (OR)<sub>3</sub>Si-CH<sub>2</sub>C1; (OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>C<sub>6</sub>H<sub>12</sub>O<sub>5</sub>CONH;

(OR)<sub>3</sub>Si-CH<sub>2</sub>CH<sub>2</sub>C<sub>6</sub>H<sub>4</sub>S; (OR)Si-CH<sub>2</sub>CH<sub>2</sub>C<sub>6</sub>H<sub>5</sub>O; and (OR)<sub>3</sub>Si-(CH<sub>2</sub>)<sub>n</sub>X wherein

X = -F, -Cl, -Br or -I and n = 1 to 20, and wherein R is hydrogen, unsubstituted

branched and unbranched C<sub>1-20</sub>-alkyl, substituted branched and unbranched

C<sub>1-20</sub>-alkyl, unsubstituted branched and unbranched C<sub>1-20</sub>-alkenyl, substituted

branched and unbranched C<sub>1-20</sub>-alkenyl, substituted, unsubstituted, and multiple

ring aryl groups, and wherein R is the same or different.

12. (Currently Amended) The porous glass composite material of claim [[8]]  
11, wherein the additive is selected from the group consisting of photoactive molecules,  
photoresponsive molecules, dyes, negatively charged polymers, positively charged  
polymers, metal ions or complexes thereof, redox-active molecules, biologically active  
molecules, biologically derived molecules and combinations thereof.

13. (Original) The porous glass composite material of claim 12, wherein the biologically active molecules are selected from the group consisting of carbohydrates, proteins, enzymes, peptides, nucleotides, DNA, RNA, cellular components and combinations thereof.

14. (Original) The porous glass composite molecule of claim 13, wherein the carbohydrate is selected from the group consisting of monosaccharides, disaccharides, polysaccharides and combinations thereof.

15. (Original) The porous glass composite molecule of claim 12, wherein the additive is a photoactive spiropyran molecule.

16. (Original) The porous glass composite molecule of claim 15, wherein the photoactive spiropyran molecule is 1'(2-carboxyethyl)-6-nitroBIPS.

17. (Original) The porous glass composite molecule of claim 12, wherein the additive is a photoresponsive molecule selected from the group consisting of flavin mononucleotide (FMN),  $\beta$ -nicotinamide adenine dinucleotide reduced form (NADH), bacteriorhodopsin, 8-hydroxy-1,3,6-pyrenetrisulfonic acid trisodium salt, luminol (5-amino-2,3-dihydro-1,4-phthalazonedione), bis-N-methylacridinium nitrate (N,N' - dimethyl-9,9'biacridinium dinitrate), fluorescein or its sodium salt ( $C_{20}H_{12}O_5$  and/or  $C_{20}H_{10}O_5Na_2$ ), and combinations thereof.

18. (Original) The porous glass composite material of claim 12, wherein the metal ion is a transition metal ion.

19. (Original) The porous glass composite material of claim 18, wherein the metal ion is a transition metal ion.

20. (Original) The porous glass composite material of claim 12, wherein the additive is selected from the group consisting of a polymer poly(acrylic acid), a polymer poly(itaconic acid), a polymer poly(ethylene glycol) and combinations thereof.

21. – 32. (Cancelled)

33. (Currently Amended) ~~A porous glass composite material as set forth in claim 37~~ A porous glass composite material comprising a gel that comprises water and a polymeric network comprising an alkoxosilane derivative, the network having a group of alterable charge, a hydrophobic group and a hydrophilic group, wherein the alkoxosilane derivative is a derivative of an alkoxosilane having the general formula  $(OR^1)_3Si\text{-}spacer\text{-}Si(OR^2)_3$ , wherein  $R^1$  and  $R^2$  are the same or different and are selected from the group consisting of hydrogen, unsubstituted branched and unbranched  $C_{1-20}$ alkyls, substituted branched and unbranched  $C_{1-20}$ alkyls, unsubstituted branched and unbranched  $C_{1-20}$ alkenyls, substituted branched and unbranched  $C_{1-20}$ alkenyls, unsubstituted branched and unbranched  $C_{1-20}$ alkynyls, substituted branched and unbranched  $C_{1-20}$ alkynyls, substituted, unsubstituted, and multiple ring aryl groups, and combinations thereof, and

wherein the spacer corresponds to a formula selected from a group consisting of

$-[(CH_2)_3NH(CH_2)_2NH(CH_2)_3]-$ ,  $-[(CH_2)_3NH(CH_2)_3]-$ , and -

$[CH_2CH_2CH_2NHCONHCH_2CH_2CH_2]-$ .

34. - 37. (Cancelled)